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PATENT ABSTRACTS OF JAPAN

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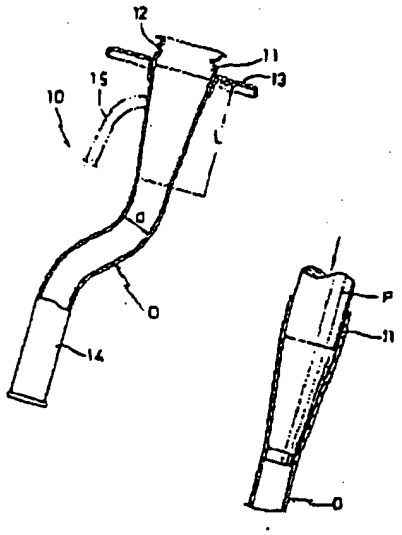
(54) FILLER TUBE

(57) Abstract:

PURPOSE: To form a filler tube using a single elementary tube instead of dividing the filler tube into plural portions by having the vicinity of the injection port of the raw tube expanded with a slow gradient, toward its entrance.

CONSTITUTION: A filler tube 10 is formed by having the vicinity of a fuel injection port 11 of a small diameter elementary tube D expanded with a slow gradient toward its entrance. When the elementary tube is expanded like this, a punch P formed along a desired gradient shape is being inserted from the direction of the fuel injection port 11 of the elementary tube D. In this case, the tube expansion ratio per axial unit length can be reduced and the insertion of the punch P when the elementary tube is expanded can be facilitated by slowly expanding the raw tube D, and thus the final tube expansion ratio can be increased.



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⑬公開　昭和58年(1983)11月12日

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⑭フイラーチユーブ

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明　　細　　書

1 発明の名称　　フイラーチユーブ

2 特許請求の範囲

(1) 燃料注入口近傍をその入口方向に向けて斜めに傾斜して延管し、かつ、この傾斜部分の軸方向長さを延管の一般径に対して十分に大きく設定したことを特徴とする金属管よりなるフイラーチユーブ。

3 発明の詳細な説明

本発明は自動車や農耕機等の原動機に使用する燃料を貯蔵するタンクに、燃料供給源から燃料を注入するためのフイラーチユーブに関する。

この種のフイラーチユーブは、自動車の衝突・燃料系等に係る各種の法規制により燃料注入口近傍の直径が約48～53㎜必要である。そこで、フイラーチユーブを金属管で形成する場合、従来第1図に示すようにフイラーチユーブ1の全長に亘つて燃料注入口2と同径の直管Aを用いて、これを適宜折曲する等して形成していた。ところが、かかるフイラーチユーブ1は燃料注入口2は前述した理由により大径化する必要があるが、燃料のタンクに挿設される部分（図中下端部）は注入される燃料を通過させれば足り、前記燃料注入口2に比べて小径化しても十分に目的は達成される。従つて、前記フイラーチユーブ1は前述したように全長に亘つて大径の直管Aを用いて形成していたため、重量の増加および大径の直管Aによる材料費そして加工費の増加を余儀なくされていた。

そこで、近年にあつては第2図に示すように、

燃料注入口2aより小径の孔管B（たとえば、φ2.7mm）を用い、該燃料注入口2近傍を直線状に孔管して目的の燃料注入口2aを得るようにしたフィラーチューブ1aがある。しかしながら、このように燃料注入口2a部分を直線状に孔管する方法では、孔管Bに対する孔管後の燃料注入口2a径の比で表わされる孔管率が一般に約1.3～1.4程度が冷間加工での加工限度とされている。このことは、孔管径をより小さくし、使用される材料費削減、加工費低減、重量軽減等の効果を発揮する上での限界を示している。従つて、これら効果を更に増すためには前記孔管率を大きくすればよいことがわかる。そのため、前記孔管率限界を増大する手段として、第3図に示すようにフィラーチューブ1bを燃料注入口部分3と燃

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料タンク側の部分4とに2分割し、前記燃料注入口部分3は燃料注入口2bの所定径と同径の素管を用い、燃料タンク側を絞り加工して小径に形成し、この小径部分3aに前記燃料タンクへの取付部分4を溶接等により固着することで、該取付部分4に用いられる素管Cを更に小径化（たとえば、φ10mm）する方法が考えられている。しかし、このように2分割式のフィラーチューブ1bにあつては、分割した夫々の部分3，4を形成するための加工費および分割された両者を固着するための加工費が嵩むと共に、固着部分のシール性等の所定の品質を満たすために高度の技術を要し、やはり製品のコストアップを招いられてしまうという問題点があつた。

本発明はかかる従来の問題点に鑑みて、フィラ

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ーチューブを分割して形成することなく1本の素管で形成し、しかも、燃料注入口近傍を従来の孔管率限界を大きく向上し、使用する材料費の削減、加工費の低減そして車体重量の軽減を図ることができるフィラーチューブを提供することを目的とする。この目的を達成するために本発明は、燃料注入口近傍をその入口方向に向けて曲々に曲折して孔管し、かつ、この曲折部分の長さを素管の一般径に対して十分に大きく設定したことにある。即ち、本発明のフィラーチューブにあつては、燃料注入口近傍をその入口方向に向けて曲々に曲折して孔管することにより、軸方向の単位長さ当たりの孔管率が従来の値に大きくなることがなく、また、孔管する際のポンチの挿入が容易となる等の理由により、小径の素管から曲々に孔管し、該

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最終的に燃料注入口を目的とする所定の径に孔管することができるものである。

以下、本発明の一実施例を図に基づいて詳細に説明する。

即ち、第4図は本発明の一実施例を示すフィラーチューブ10を示し、このフィラーチューブ10は小径の素管Dを用いて、燃料注入口11近傍をその入口方向に向けて曲々に曲折して孔管する。このとき、この曲折部分の長さLを素管Dの一般径に対して十分に大きく設定する。たとえば、前記素管Dに31.8mmφのSTXM11A材を使用し、前記曲折部分の長さLを約120mmに設定して曲折状に孔管し、最終的な燃料注入口11径を前述したように所定の48mmφ～53mmφとなるようにしてある。ところで、このように燃料注入

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口11近傍を傾斜状に拡管するには、図3図に示すように、目的の傾斜形状に沿つて形成されたポンチPを、素管Dの燃料圧入口11方向から挿入しつつ拡管するのであるが、このとき、素管Dが徐々に拡管されていくことにより、軸方向の単位長さ当たりの拡管率が小さく、また、拡管する際の前記ポンチPの挿入が容易となることによつて、最終的な拡管率を大きくすることができる。尚、本実施例にあつては図4図に示すように燃料圧入口11端に図外のフィラーキャップを螺着するためのねじ部12が形成され、また、このねじ部12の下端部には前記燃料圧入口11の外周に配置されるフランジ13がスポット溶接等によつて固着されている。このフランジ13は図外の車体パネル、たとえば燃料圧入用の開口が形成され

(c)正寸カット時間を夫々対比して表わすと次表の様になる。

〔表〕

	素管径×板厚	(a)素管カット費	(b)曲げ加工用ベンダー設備費	(c)正寸カット時間
本発明	φ31.8×1.2	12円/1本	300万円(1台)	0.2分/1本
従来	φ42.7×1.2	13円/1本	380万円(1台)	0.30分/1本
従来	φ60.5×1.2	14円/1本	又は350万円(2台) 380万円(3台)	0.28分/1本

尚、ここで、(a)素管カット費とは、通常の素管長さ(5000mm～6000mm)をフィラーチューブ1ヶ分の所定長さにカットするための定尺ベースの費用。(b)曲げ加工用ベンダー設備費とは、フィラーチューブを燃料タンクに組付するための所定形状に曲折する必要があるが、このときの曲げ

加工を行なう際のベンダー設備費で、この曲げ加工機(ベンダー等)も被加工材の硬さにより使い分ける方がコスト的に有利のため通常この使い分けが行なわれている。(c)正寸カット時間とは、所定寸法にカットされた素管を曲げ加工等を施した後、最終的に製品指定寸法にカッター等でカットする際の加工時間で、被加工材の硬度、外径により決定される。また、フィラーチューブ10を車体に取付ける際、フェンダー等の車体パネルの開口からビス等を介してフランジ13を固定するのであるが、前記車体パネルの裏側は狭いスペースであるため、燃料圧入口11近傍を、従来の様に曲げ形状とする場合に比べて、本実施例の様に傾斜にしたことによつてスペースを広く確保でき、取付作業性を向上することができる。

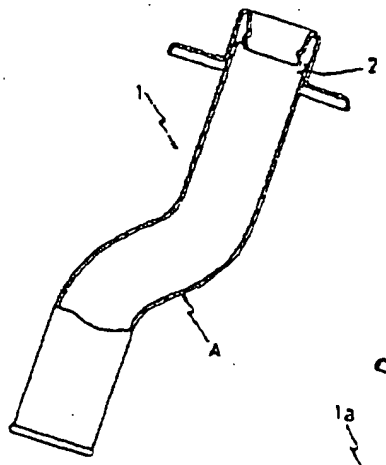
以上説明したように、本発明のフィラーチューブにあつては、燃料注入口近傍をその入口方向に向けて徐々に拡径して拡管し、かつ、この拡径部分の長さを素管の一般径に対して十分に大きく設定したことによつて、拡管加工限界を大きく向上できる。従つて、目的の燃料注入口径を得るにあたつて、小さな径の素管を用いて一体成形により形成することができるため、使用する素管材料費の削減とフィラーチューブを加工するための加工費の低減によつて製品のコストダウンを図ることができ、また、単位重量の軽減をも達成することができる。更に、燃料注入口近傍を傾斜させることによつて取付スペースを広く確保でき、取付作業性の向上を図ることができるという優れた効果を奏する。

4. 図面の簡単な説明

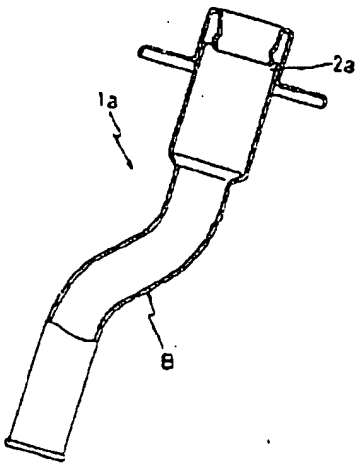
第1図，第2図，第3図は夫々従来のフィラーチューブを示す断面図、第4図は本発明のフィラーチューブの一実施例を示す断面図、第5図は本発明のフィラーチューブを形成する際の一手段を示す説明図である。

1，1a，10，10…フィラーチューブ、2，2a，10，11…燃料注入口、A，B，C，D…素管、L…拡径部分の長さ。

代理人　志　賀　富　士　弥

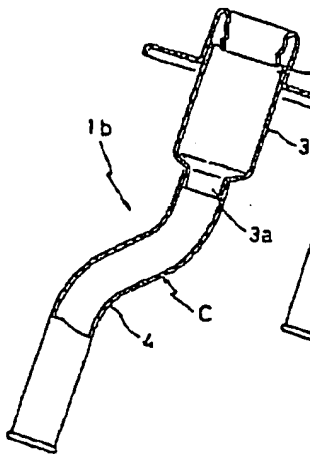


第1図

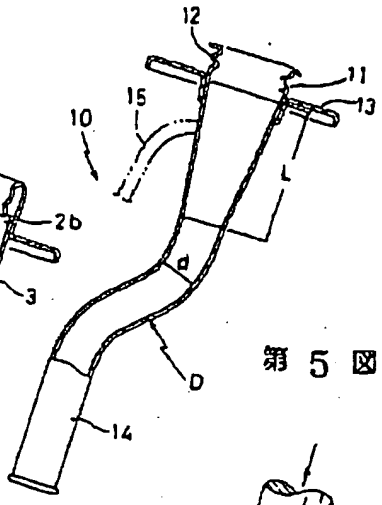


第2図

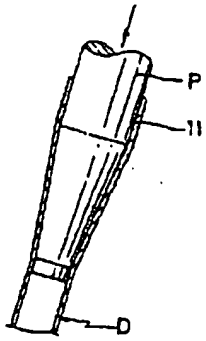
第 3 図



第 4 図



第 5 図



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(54) Title of Invention: Vehicle Fuel Inlet Opening Structure

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(22) Patent Application Date: October 23, 1996

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(54) [Title of the Invention] Vehicle Fuel Inlet Opening Structure

(57) [Abstract]

[Purpose] To reduce the filler tube diameter to prevent air pollution caused upon fuel filling without sacrificing the fuel-filling characteristic.

[Solution Means] Having the tube general area, 11a, of the filler tube, 11, smaller in diameter than the neck area, 12, makes the gap between the fuel liquid column and (the tube inside) smaller during fuel filling, and prevents evaporated fuel from externally flowing from the fuel inlet opening. Also, having the nozzle insertion restriction hole, 15, in the shutter plate, 14, in a vertically-oblong shape makes swinging of the fuel filler nozzle, 7, in the vertical direction free, and the base area of fuel filler nozzle 7 can be securely engaged/held at the threaded area, 13, of the fuel inlet opening. Thus, enlargement of the tube diameter in tube general area 11a, which causes fuel flow resistance, for allowing a swing motion is not needed, and both the holding characteristic of fuel filler nozzle 7 and the fuel filling characteristic can be satisfied.

[Claims]

[Claim 1] A vehicle fuel inlet opening structure, which is characterized by having a threaded area at the filler tube neck area opening end inside periphery; a shutter plate, at the neck mid area, which is provided with a nozzle insertion restriction hole that selectively restricts insertion of the fuel filler nozzle which is inserted from the aforementioned opening end and engaged/held at the threaded area; a tube general area which is connected to the neck area that is smaller in diameter than the neck area; and the nozzle insertion restriction hole in the aforementioned shutter plate is a vertically-oblong hole allowing a swing motion in the vertical direction of the fuel filler nozzle.

[Claim 2] The vehicle fuel inlet opening structure of Claim 1 which is characterized in that the threaded area and the shutter plate are provided in an inner tube which is fit and secured in the neck area of the filler tube.

[Detailed Explanation of the Invention]

[0001]

[Technology Field to Which the Invention Belongs] This invention relates to a vehicle fuel inlet opening structure.

[0002]

[Prior Art] Figure 3 shows a conventional vehicle fuel inlet structure where 1 is the filler tube of which the neck area protrudes into and is joined to the vessel, 5, which is joined to the peripheral edge of the opening area, 4, of the vehicle outer panel, 3.

[0003]

A threaded area, 6, is formed on the inside periphery of the opening in the neck area, 2, for securing the filler cap (not shown) with threads.

[0004]

Fuel filler nozzles have different diameters for leaded gasoline and for non-leaded gasoline, and vehicles using non-leaded gasoline are provided with a shutter plate, 8, in the mid area of the neck area, 2, with a nozzle insertion restriction hole, 9, which allows insertion of the nozzle for non-leaded gasoline that has a small diameter, and does not allow insertion of the nozzle for leaded gasoline that has a large diameter.

[0005]

The fuel filler nozzle, 7, is provided with a spiral line, 10, on the outer periphery at the base area, so that nozzle 7 inserted into neck area 2 at fuel filling can be held by engagement of spiral line 10 with threaded area 6 at the inside periphery of the opening of neck area 2, that is, the fuel inlet opening.

[0006]

[Problems the Invention is to Solve] Filler tube 1 needs to be large in diameter to some extent so that fuel filler nozzle 7 can be easily inserted into the fuel inlet opening at neck area 2, but also filler tube 1 needs to be as small in diameter as possible so as not to create much gap between the fuel liquid column and tube inside during fuel filling for prevention of air pollution by evaporated fuel external flowing from the fuel inlet opening. Thus, as shown in Fig. 3, neck area 2 of filler tube 1 is enlarged in diameter for assurance of insertion ease of fuel filler nozzle 7 and, at the same time, a small diameter in tube general area 1a as drawn by an imaginary line is required so as not to create much gap between the fuel liquid column and the tube inside during fuel filling.

[0007]

However, when tube general area 1a is made small in diameter, and if the front tip of fuel filler nozzle

7 interferers with the inside surface of tube general area 1a when fuel filler nozzle 7 is inserted into nozzle insertion restriction hole 9 of shutter plate 8, the swing motion of fuel filler nozzle 7 in the vertical direction is restricted at the contact point between fuel filler nozzle 7 and the inside surface of tube general area 1a and the contact point between (the nozzle) and nozzle insertion restriction hole 9 edge, and engagement of spiral line 10 which is on the outer periphery of fuel filler nozzle 7 at the base area with threaded area 6 at the fuel inlet opening edge is not possible and the holding characteristic of fuel filler nozzle 7 is lost.

[0008]

Therefore, for assurance of the fuel filler nozzle 7 holding characteristic, an expanded-diameter area, 1b, the diameter of which is somewhat larger than the tube general area as shown by the solid lines in the drawing, is needed for allowance of the swing motion of fuel filler nozzle 7 in the vertical direction. As a result, the fuel-filling characteristic is sacrificed because of the increased flow resistance of the fuel that is flowing out from fuel filler nozzle 7 at the step area between expanded-diameter area 1b and tube general area 1a.

[0009]

Thus, this invention presents an automobile fuel inlet opening structure with a filler tube having a small diameter without sacrificing the fuel-filling characteristic, which can prevent air pollution at the time of fuel filling.

[0010]

[Means to Solve the Problems] In Claim 1, the structure is characterized by having a threaded area at the filler tube neck area opening end inside periphery; a shutter plate, at the neck mid area, which is provided with a nozzle insertion restriction hole that restricts insertion of the fuel filler nozzle which is inserted from the aforementioned opening end and engaged/held at the threaded area; a tube general area which is connected to the neck area that is smaller in diameter than the neck area; and the nozzle insertion restriction hole in the aforementioned shutter plate is a vertically-oblong hole allowing a swing motion in the vertical direction of the fuel filler nozzle.

[0011]

In Claim 2, the structure is characterized in that the threaded area and the shutter plate described in

Claim 1 are provided in an inner tube that is fit and secured in the neck area of the filler tube.

[0012]

[Effect(s) of the Invention] According to Claim 1, since the tube general area of the filler tube is smaller in diameter than the neck area, not much gap between the fuel liquid column of flowing fuel and the inside surface of the tube general area can be easily generated, and external flow of evaporated fuel from the fuel inlet opening can be prevented, and since the nozzle insertion restriction hole in the shutter plate provided in the neck area is made as a vertically-oblong hole which can allow swing motions of the inserted fuel filler nozzle in the vertical direction, the fuel filler nozzle will not be restricted at the inside surface of the tube general area or at the nozzle restriction hole in the shutter plate and can freely swing in the vertical direction. Thus, the fuel filler nozzle can be securely engaged/held in the threaded area on the inside periphery at the opening end in the neck area without forming an expanded-diameter area for allowance of the swing motion of the fuel filler nozzle in the vertical direction at the joint area between the tube general area and neck area and, therefore, both the fuel filler holding characteristic and the fuel filling characteristic can be improved.

[0013]

According to Claim 2, in addition to the effects of Claim 1, since the threaded area and shutter plate are provided in the inner tube that is secured in the neck area of the filler tube, provision of this threaded area and shutter plate can be done easily.

[0014]

[Working Forms of the Invention] One working form of the invention is discussed with illustrations where the same symbols are used as for the conventional structure.

[0015]

With reference to Fig. 1 and Fig. 2, 11 is the filler tube and its neck area, 12, is made large in diameter for easy insertion of the fuel filler nozzle, 7. The open end of neck area 2, i.e. the fuel inlet opening end, is protruded into the vessel, 5, which is joined to the periphery of the opening area, 4, of the vehicle outer panel, 3, and (the fuel inlet opening end) is connected to vessel 5 at the protruding area.

[0016]

Also, tube general area 11a which follows neck area 12 of filler tube 11 is made smaller in diameter

than neck area 12 so that not much gap between the fuel liquid column and the (tube) inside surface is created when fuel is fed from the fuel filler nozzle 7 that is inserted in the fuel inlet opening.

[0017]

The connecting area between neck area 12 and tube general area 11a is formed in a tapered shape so that the front end of inserted nozzle 7 will not interfere, and the center line of tube general area 11a is offset in the lower direction from the center line of neck area 12 for easy insertion of fuel filling nozzle 7, as a result, the upper side of the taper area has a larger slope (than the lower side).

[0018]

Threaded area 13 is provided on the inside periphery at the opening end of neck area 12 for securing the filler cap (not shown), and shutter plate 14 with nozzle insertion restriction hole 15 that allows the diameter for the designated fuel filler nozzle is provided at the mid area of neck area 12. In this working form, this threaded area 13 and shutter plate 14 are provided in inner tube 16 which is fit and joined inside neck area 12.

[0019]

And, nozzle restriction hole 15 in shutter plate 14 is a vertically oblong hole which allows swing motions in the vertical direction of fuel filler nozzle 7 inserted into nozzle insertion restriction hole 15. That is, the minor axis (of the oblong hole) allows entry of only designated fuel filler nozzle 7, and the major axis is formed in the vertical direction.

[0020]

With the structure of this working form, tube general area 11a which follows neck area 12 of filler tube 11 is made smaller in diameter than neck area 12 for prevention of gap creation between the fuel liquid column of fuel fed from the fuel filler nozzle 7 and the inside surface of tube general area 11a. Thus, escape of evaporated fuel through a gap area to the environment through the fuel inlet opening can be prevented and air pollution due to external escape of evaporated fuel at the time of fuel filling can be prevented.

[0021]

Also, when fuel filler nozzle 7 is inserted into the fuel inlet opening at the end of neck area 12 and through nozzle insertion restriction hole 15 in shutter plate 14 which is provided in the mid area of neck

area 12 at the time of fuel filling, fuel filler nozzle 7 can be freely swung vertically for assured engagement and holding of spiral line 10 provided on the outside (of the nozzle) at its base area into threaded area 13 at the inside periphery of the opening end of neck area 12, because nozzle insertion restriction hole 15 is formed as a vertical-oblong hole which allows swing motions in the vertical direction.

[0022]

Therefore, fuel filler nozzle 7 can be assuredly engaged and held at the end of the fuel inlet opening without forming an expanded-diameter area for allowing swing motions in the vertical direction of fuel filler nozzle 7 in the connecting area between tube general area 11a and neck area 12. Also, since there is no step that would cause fuel flow resistance due to a diameter-expanded area in tube general area 11a, both the holding characteristic of fuel filler nozzle 7 and fuel filling characteristics can be improved.

[0023]

Also in this working form, since threaded area 13 and shutter plate 14 are provided in inner tube 16 which is to be fit and secured inside neck area 12, this threaded area 13 and shutter plate 14 can be easily provided in neck area 12.

[Brief Explanation of the Drawings]

[Fig. 1] Cross section drawing illustrating one working form of the invention.

[Fig. 2] Drawing of view A-A in Fig. 1.

[Fig. 3] Cross section drawing that shows a conventional structure

[Explanation of Reference Materials]

7 Fuel filler nozzle

11 Filler tube

11a Tube general area

12 Neck area

13 Threaded area

14 Shutter plate

15 Nozzle insertion restriction hole

16 Inner tube

Fig. 1

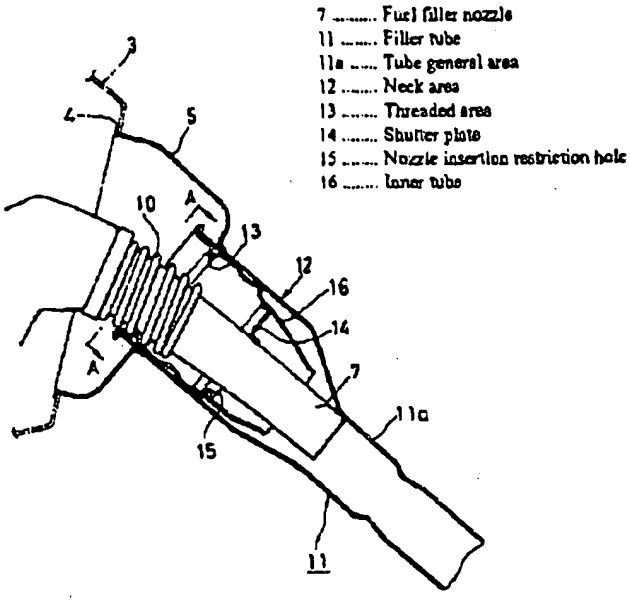


Fig. 2

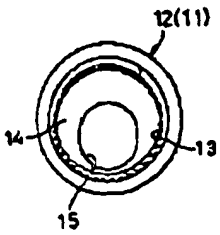
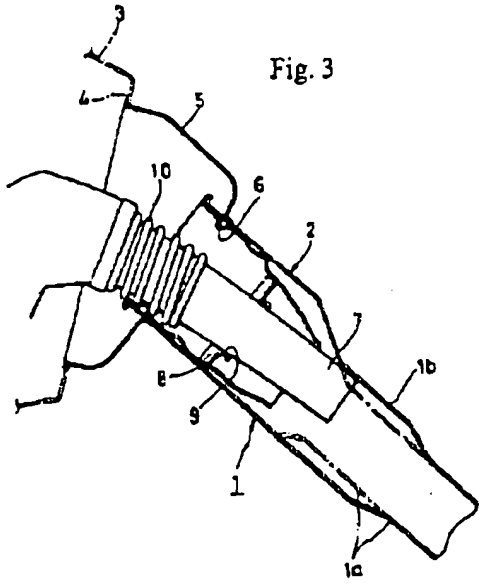


Fig. 3



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Certification

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This is to certify that the above-stated document was translated by Japan-America Management, Ltd. from Japanese into English, and that it represents an accurate and faithful rendition of the original text to the best of my knowledge and belief.

By:

Mario Ciricola
Manager
March 24, 2004